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Types of instructional media which can encourage creative behavior are presented. At certain grade levels there are discontinuities in creative development accompanied by loss of interest in learning. Some discontinuities can be decreased or eliminated by guided, planned experiences in creative thinking. These in turn can be translated into instructional materials in the form of audiotapes, teacher's manuals, and exercises.

Audiotapes, films, and other materials should be developed to engage children in sequences of creative thinking activities, leading to increasingly higher stages of thinking. Textbooks, workbooks, and other materials can be redesigned so as to develop research concepts and skills in young children that will become tools in their thinking throughout their lives. Honesty and realism in presenting the lives of creative people is helpful to children's creative development. Knowledge can be presented as incomplete, and students can be asked provocative questions which will engage more of their creative potential. Elaboration as well as originality should be encouraged. Instruction for different types of learners should be individualized through differentiated curriculum materials. To keep textbooks flexible and, simultaneously, to develop creative skills, laboratory manuals or workbooks should be separate. Inservice education materials should be developed for encouraging classroom creativity.

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Creativity TD

IMPLICATIONS OF CREATIVITY RESEARCH FINDINGS FOR INSTRUCTIONAL MEDIA[1,2]

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Most of the creativity research which I have conducted or directed has been concerned primarily with the kinds of teacher behaviors which encourage creative behavior. Thus, most of the ideas contained in this paper are speculations concerning the kinds of instructional media which will either supplement or substitute for teacher behaviors which seem to be indicated by our researh findings. In some cases, however, the ideas presented have already been translated into instructional media by me, some of my graduate advisees, or graduate students in other universities who have modified or tested some of the instructional media developed by us. With one exception, these efforts have been without financial support and as a consequence have been small-scale and rarely sustained and elaborated. One such effort has become practically self-supporting but has required tremendous energy to sustain and has not yielded enough profit to permit research and evaluation.

I find the discussion of implications of creativity research findings for instructional media quite complex. In the construction of a single piece of instructional material I find that we may apply deliberately findings from as many as a dozen different studies and then find that we have violated another or find still others unknowingly applied. If we take a single research finding, we can produce dozens of possible implications for instructional media. Thus, I shall limit myself to

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[1] Paper prepared for U.S. Office of Education Work Conference on Creativity and Instructional Media, August 31 - September 3, 1964, San Diego, Calif.

[2] The author is indebted to the New World Foundation, New York City, for a grant which has made it possible to examine, evaluate, and think about applications of creativity research to elementary education, including instructional media.

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the discussion of some of the more persistent and recurrent research findings which seem to have some of the more far-reaching implications.

Implications of Discontinuities in Creative Development

One of the most persistent and recurrent findings in creativity research with children is that there are discontinuities in creative development, apparently accompanied by loss of interest in learning, increase in behavioral problems, and increase in emotional disturbance. These discontinuities have been noted by a variety of investigators for many years (Andrews, 1930; Colvin and Meyer, 1906; Kirkpatrick, 1900; Mearns, 1931; Simpson, 1922; Whipple, 1915; and Wilt, 1959). At least in Anglo-American cultures these discontinuities seem to appear at about the kindergarten, fourth grade and seventh grade levels. Children at these stages of development perform less well than they did a year earlier and less well than children at the next lower educational level on tests of imagination, originality, creativity, and divergent thinking regardless of the label used. They also participate in fewer creative activities on their own, appear to lose some of their curiosity, manipulativeness, and excitement about learning. There are also some indications that these are peak periods of psychiatric referral, remedial instruction, and behavior problems. They are certainly peak periods of concern for the parents who write me letters concerning the struggles of their creative children.

In the past, little significance has been attached to these discontinuities in development. Observers have concluded that these were natural, genetically determined phenomena about which nothing could be nor need be done. Others have discounted the significance of these

findings by pointing out that we have plateaus in almost all kinds of development. It has seemed to me, however, that these drops in creative functioning are more serious than learning plateaus and are man-made or culture-made. As we have begun to concentrate upon the discontinuity which occurs at about the beginning of the fourth grade, we find that the pupils in one fourth-grade class in a school may continue to show growth while those in another class of the same school show a decrement. Or, all of the fourth grade classes in one school may show growth while those in another school may all show decrements. No discontinuities occur in such continuous cultures as Western Samoa, Sikhs in India, and the like (Johnson, 1963; Torrance, 1963a).

What most people have failed to recognize is the evidence that development can be quite different when children experience guided, planned experiences than when they experience only what the environment just happens to provide (Ojemann, 1948; Ojemann and Pritchett, 1963). My associates and I have demonstrated (Torrance and Gupta, 1964) that the concept of guided, planned experiences in creative thinking can be translated into instructional materials in the form of audio-tapes, teacher's manuals, and exercises which eliminate for most fourth-grade children the fourth-grade slump in creativity and result in fewer children hating school and greater participation in self-initiated activities of a creative nature. As in other concepts of guided, planned experiences, the development of materials is guided by an analysis of the structure of the learning task, the nature and status of the learner, and the motivation of the learner to participate in the sequence of activities designed to facilitate a particular kind of development.

In my opinion, we find the clue to constructing materials to eliminate discontinuities in creative development in the theory behind the Mental Orthopedics designed by Alfred Binet and discussed in his 1909 publication (Les Idées Modernes sur les Enfants). Binet maintained that all, or almost all, children begin school with highly developed skills in learning by experimenting, manipulating objects, rearranging them and combining them in different ways, singing, drawing, dancing, story-telling and the like. It was his contention that we should graft education on these already highly developed learning skills rather than suddenly abandoning learning in these ways for learning in ways strange to the child.

In designing instructional materials to reduce discontinuities in creative development, it seems reasonable that there should be a reduction in the discontinuities in vocabulary, style of presentation, and the nature of the intellectual skills called into play. Efforts should be made to make positive, creative use of the early learned ways of learning. Viewed in this way, it would not be necessary to invoke such psychological concepts as primary processes, regression, primitivation, and the like. It would not be necessary for Synectics groups (Gordon, 1961) to work so hard to create the psychological state of play. At least for education, it might be more productive to abandon these concepts and cast the phenomena in more positive, pushing forward rather than regressing behavior -- that is, of building onto the learning skills that are developed almost from birth.

Changing Ways of Storing Information

Although both Ray Hyman (1961, 1963) and I and my associates (Torrance and Harmon, 1961; Torrance and Staff, 1964) have by no means

answered all of the questions about the storage of information and the availability of information for use in the creative solution of problems, it does seem quite clear that the attitude one assumes toward the information he possesses makes a great deal of difference about the way it will be used. I have found it quite easy to create different attitudes, sets, or expectations about information among my own students. These attitudes in turn make a great deal of difference in what students do with the information they encounter. For example, I may ask some students to read research articles during the first half of a course with a critical set, identifying defects in the researcher's assumptions, statement of his problem, hypotheses, instruments of data collection, experimental procedures, analysis of data, and interpretation of findings. Other students are asked to read research articles with a constructive, creative set, trying to think of other possibilities, applications, and the like. The latter group of students during the second half of the course are themselves able to develop more original and useful ideas and to produce a larger number of creative applications of specific information than are their critical peers. Similar kinds of results were obtained when sets were established for reading traditional textbook material.

Since books provide perhaps the best invention yet for becoming educated, it might be that we should put a large share of our creative energy into inventing ways of making books more effective for evoking creative behavior. I am convinced that we can build into textbooks at all levels of education much of what we have learned from research about the creative process, the creative thinking abilities, the creative

personality, and conditions favorable to creative growth. I tried deliberately to do this in one textbook in my own teaching field, personality and mental health. I employed many techniques to involve the reader and his experiences. The language I chose was self-involving. I tried to heighten anticipation, gave the reader opportunities to reorganize and rearrange information for various purposes, and the like. Instead of the usual dull, repetitious summaries, I gave the reader opportunities to synthesize the knowledge contained in a chapter for the purpose of solving problems. I encouraged scanning and other devices for getting ideas. Since the publisher would not release me from my contract, I was forced to abandon all of these devices. The manuscript is now in the final stages of editing and contains none of the self-involving language and none of the devices to encourage the reader to reorganize information. All of the liveliness and originality of expression are being edited out. Everything to heighten expectations, to encourage thinking in terms of possibles, and to facilitate creative application of knowledge has been eliminated. Each chapter now has a very proper summary. Except for content it has become a conforming, traditional text. Everything that we award points for originality and interest in children's compositions has been edited out.

Perhaps one type of support that the U. S. Office of Education should consider is the preparation, editing, and testing of sample textbooks having the same subject-matter content insofar as facts and data are concerned. They would differ in format. One variation would be the type which publishers and editors now insist upon. The other would be the type that applies deliberately creativity research findings. In the experimental texts deliberate attempts would be made to build into them

the best we know about the creative process, the creative person, and the like. Skills in creative problem-solving of various kinds would be encouraged. A different set of criteria would be employed by editors in reshaping the author's ideas than is in current use.

I realize that this would be a relatively expensive type of experiment and one not likely to be supported by publishers. Thus, I believe that it is a kind of effort which must be supported by the U. S. Office of Education, foundations, and the like. I also believe that such experiments are likely to lead to success. Already we have some excellent examples in the form of courses which have been carefully redesigned in much the same way that I have advocated for the redesigning of textbooks. One of the more carefully and elaborately worked out experiments was Sommers' college level experiment in industrial design. He carefully kept the subject-matter content of the two courses constant in the control and experimental classes through two replications of the original experiment. Not only did he find greater growth in general creative thinking ability when the materials were presented according to the creative thinking design, but he also found significantly higher achievement on his traditional tests of understanding of principles, application of principles, and the like, as measured by multiple-choice tests. Apparently, having produced, tested, and experimented with a diversity of approaches, the experimental subjects gained greater mastery of the fundamental ideas taught in the course.

Materials that Permit One Thing to Lead to Another

Almost by definition, the creative process requires that one thing be permitted to lead to another. On many occasions as I have conducted

experiments, tested children, and observed classroom activities during the past seven years, it has struck me that it is quite unnatural for children to be herded from one unrelated activity to another every 15 or 20 minutes with no opportunity to become absorbed in anything, with no continuity. I can recall a class of fifth grade pupils being rebuffed continually by the teacher because they kept asking about things studied earlier in the day and because they kept pointing out relationships between what they were studying at the time and what they had studied in another course the day before. This occurred near the beginning of the term. No such observations were recorded near the end of the school year. On the other hand, I can recall the excitement of one third grade class in a creative dramatics project involving original serials created by class members. I have observed these continued dramatics during an hour when the teacher was out of the classroom. These productions were well organized and there was absorbed watching and listening on the part of all members of the class.

Our own attempts to create guided, planned experiences in creative thinking through audio-tapes, thinking activities, teacher guides, and the like for the fourth grade represent one attempt to provide such sequences of experiences. One series is called "Great Moments of Scientific Discovery." Another is concerned with "Great Moments of Geographic Discovery"; another, "Great Moments in History." Still another involves fantasies. The heart of the audio-tapes in the first three series is dramatized episodes in the lives of creative persons. These are designed to grip the interests of children and to familiarize them with the nature and value of the creative process, the creative person, and creative achievement. These may be stopped at strategic points for problem-solving,

guessing of consequences, and consideration of various possibilities. Usually, however, this occurs after the playing of the dramatized episodes. This is followed by discussions, inquiries and either individual or group activities of a creative nature. The teacher guides offer many alternatives and challenge teachers to produce their own ideas to achieve goals stated in the manuals or the specific goals of the class. On a subsequent day, a related experience is presented by means of the audio-tape. This experience may involve an experiment, creative writing, art, dramatics, song writing, creative problem-solving, inventing, or any of a number of other creative activities.

For example, the dramatized episodes of the life of Louis Braille emphasize the idea that a child's ideas may be valuable and that great discoveries and inventions occur through persistence, building onto the ideas and failures of others, and courage. One of the lessons accompanying this story leads children to make an inventory of the things that bother them and to select their most bothersome "thorn in the flesh." They are asked then to define the characteristics of the device, procedure, or the like that would solve this bothersome problem. They are then asked to find out what other attempts have been made to solve this problem and to build onto it.

Realistic problems may be related even to fantasies. For example, the dramatization based on the old Italian legend of Giovanni and the Giant gives rise to a variety of such opportunities. In the drama itself (Cunnington, Buckland and Peterson, 1962) the stop-tape device is employed. Each time Giovanni finds himself in a threatening predicament, the tape is stopped to permit the listeners to produce possible solutions to the

predicament. By the time the story is finished, each student has produced enough ideas for a new version of the Giovanni and Giant story. On the following day, however, the story may be used to encourage a very different kind of thinking. In the original story Giovanni used deception. In the related exercise, students are asked to develop some of the skills of penetrating deceptions. In one version, common, everyday swindles and hoaxes may be dramatized and the listeners asked to penetrate the deception. In another version, some of the historically famous hoaxes may be similarly dramatized and used. These may be related to the geography or history being studied at the particular time.

All of these materials make a great deal of deliberate use of the principle of warm-up and draw from such research as that of Maltzman (1960) on training for originality. One of the best examples of this is our "Sounds and Images" (Torrance and Cunnington, 1962) which makes use of a series of four sound effects presented three times. With each repetition, students are asked to stretch their imaginations further and further. The first sound effect is easily recognized, coherent, and well-organized. Succeeding sound effects increase in strangeness and lack of obvious relationships among the sound elements. The fourth sound effect involves six rather strange and unrelated sound elements, placing quite a burden upon the ability to synthesize into a coherent whole unrelated elements.

The idea books created by Myers represent another kind of attempt to create materials which engage children in a sequence of creative thinking activities, leading to increasingly higher stages of thinking. There are now two sets, including teacher guides, for the primary grades (Can

You Imagine? and For Those Who Wonder), one for the intermediate grades (Invitations to Thinking and Doing) and one for the upper elementary and junior high school years (Invitations to Speaking and Writing Creatively). All of these have been field-tested with encouraging results, some of them quite carefully done and others conducted rather subjectively.

In a number of children's books this same principle is applied with considerable skill. An example of considerable artistry in this respect is the work of the Italian artist and story teller, Bruno Munari, as in The Elephant's Wish (1959), Who's There? Open the Door (1957), and The Birthday Present (1959).

Materials That Inform about the Creative Process

Critics have questioned the value of education concerning the creative process. Some even feel that having information concerning the creative process may interfere with creative functioning. This, of course, has been one of the major goals of the audio-tapes concerning the lives of creative people such as Robert Goddard, Thomas Edison, Benjamin Franklin, and others. We do know that children obtain ideas from accounts of the creative processes of these men. We also know that they can engage in activities which require some of the same kinds of thinking processes that the creative person used in his great achievements. At a rather practical level, however, I believe we have at least one rather good experiment which indicates that just the giving of information about the creative process, overcoming blocks to creativity, and the like may result in significant creative growth not ordinarily achieved (D. N. Anderson, 1963). In a general education course in industrial arts, Don Anderson employed three conditions. In addition to the usual control

condition, he gave brief creative thinking exercises in one condition and in the other he merely handed out from time to time sheets giving information about the creative process, becoming more creative, and the like. No classroom time was devoted to a discussion of these sheets. Any discussion was among students and on their own time outside class. Students in this latter condition showed significantly greater growth in measured creative thinking abilities than their peers who had not been given these handouts or "propaganda" about creativity.

Materials for Teaching Research Concepts and Skills

Although our educational system has been delaying research experiences and requirements longer and longer, many promising developments such as those of Jablonski at the University of Pittsburgh indicate that there is a great readiness among high school and elementary school students for research. In the light of the lives of those who have become eminent as creative achievers this is not surprising; many of them began early to develop research concepts and skills. It has been my contention that children can be taught these powerful concepts early in their educational careers and that these concepts then become tools in their thinking and learning throughout their lives. They then become "overlearned" along with other skills and concepts taught at this time, whereas desirable habits and attitudes of research may never be mastered if postponed too long.

My own experiences in teaching high achieving sixth-grade pupils some of these research concepts and skills has been tremendously rewarding. We find many evidences that the children exposed to the five-day course continue to use the concepts and skills developed in their other courses

and activities in subsequent years. I try to give them a taste of a variety of kinds of research (historical, descriptive-comparative, and experimental). They are also permitted to conduct an experiment themselves and required to write it up in standard form. Myers and I (Torrance and Myers, 1962ab) have combined the materials we developed for this purpose into a monograph which has been used by a variety of teachers who report rather exciting results. I believe that such concepts and skills can be developed through practically all courses in the curriculum and that textbooks, workbooks, and other materials in various subjects can be redesigned in such a way as to develop research concepts and skills.

Honesty and Realism in Presenting Lives of Creative People

A number of people have criticized the audio-tapes in the Great Moments of Discovery series because they present such persons as Robert Goddard, Henry Ford, Samuel F. B. Morse, and the like as something less than models of social adjustment and well-rounded personalities. I have been told that we should present these great men as "more normal" or "better adjusted." Believing that anything that militates against honesty and the search for the truth is inimical to creative development, I have stood by our decision to present these personalities as honestly as possible. One of the arguments has been that this honest presentation of scientists will dissuade youngsters from careers in science and creative occupations. Our experiences with the fourth-grade materials are in contradiction to this point of view. One of the effects of the experimental materials was that there was an increase in aspirations in scientific fields, especially among the girls. There was also a

tendency for an increase in aspirations in the arts, although the tapes did not deal with the arts. There were significant increases in career aspirations in uncommon and in creative occupations.

Knowledge Presented as Incomplete

Also related to honesty of presentation is the idea of presenting knowledge as incomplete, with gaps, and unknowns. Current textbooks tend to present knowledge as being complete and absolute. This is communicated both by content and in subtle ways by the language used. I am now having a very painful experience with an editor who is superb at making my language absolute and certain and eliminating any references to unknowns, uncertainties, and gaps in knowledge. If textbooks could assume this stance, I believe it would free teachers to be more honest in this regard and to be less threatened when students ask questions about the unknowns in a particular field of study.

Closely related to this problem is that of asking provocative questions about unknowns. There is considerable evidence to indicate that most questions asked by teachers call only for the reproduction of information in textbooks. The questions asked in the textbooks are rarely much better. It is my suspicion that if textbooks contained provocative questions, this would help teachers learn how to ask such questions of their own and thereby engage much more of the creative potential of their students than is now the case. Present evidence is that even our more creative teachers ask relatively few provocative questions. Using Burkhart's criteria (Burkhart and Bernheim, 1963), I scored the questions asked by the six most and least creative teachers (as identified by a battery of creative thinking tests) in a population of

32 general business teachers. The six most creative teachers asked significantly more provocative or divergent questions than their less creative colleagues. Only about 12 per cent of their questions were of this type, however. It was less than one per cent among the six least creative teachers, however.

Materials to Encourage Creative Characteristics

If we are to cultivate and sustain genuinely creative behavior, it seems logical that our society must in a variety of ways encourage those personality characteristics which seem essential for such behavior. We have derived many clues about the nature of the creative person from the studies of Mackinnon (1961, 1962), Barron (1963), and dozens of others (Stein and Heinze, 1960). It seems to me we should be especially mindful about those characteristics which are necessary for genuinely creative behavior but which are not especially honored by our society. In order to obtain clues concerning what these characteristics are we have asked teachers and parents in our own various subcultures and in cultures outside the United States to describe the ideal pupil or the kind of person they would like for today's children to become. We have also asked serious students of the creative personality as revealed through research findings to use the same checklist to describe what might be considered a model of the productive, creative person. This enables us to identify the discrepant characteristics.

From our data it can be inferred that all of the cultures thus far studied, according to the rankings of our expert panel, are unduly punishing of the good guesser, the child who has intellectual courage, the emotionally sensitive individual, the intuitive thinker, the person

who regresses occasionally and is playful and childlike, the visionary individual and the person who is unwilling to accept things on mere say so without examining the evidence. On the other hand, they seem to lavish unduly great rewards for being courteous, doing one's work on time, being obedient and popular or well-liked by one's peers, and being willing to accept the judgments of authorities. Teachers in the United States also appear to be unduly discouraging of strong emotional feelings and unduly encouraging of receptiveness to the ideas of others. Independence in thinking is highly honored but independence in judgment is rated much lower by teachers and parents.

Since the characteristics of creative people appear in the lives of the subjects of the dramas in our Great Moments of Discovery series, these are a natural for honoring such characteristics as intellectual courage, willingness to guess and test one's guesses, emotional sensitivity, intuition, vision, and the like. Ardyth Hebeisen, a former student of mine, has been creating stories for young children that emphasize some of these characteristics. Such an effort, however, can be extended in many directions. For example, I have had some interesting exchanges with Garry C. Myers, the editor of Highlights for Children, about what might be done through his feature known as "Gallant and Goofus." I have suggested that although it is fine for Gallant to be courteous and polite, he might also picture Gallant as being honest and courageous. He recognizes this need but is somewhat fearful that this will cause children to get into trouble and that he will be blamed. In recent issues, he has been experimenting with a few ideas. Thus, we find in a recent issue (Myers, 1964) that Gallant does not cry when he loses a game, stands up and defends himself, and admits that he broke his mother's vase, apologizing of course.

Correcting Misplaced Emphases on Sex Differences

Our studies of sex differences in independent activities, measured thinking abilities, and the like, indicate rather clearly that our society places off limits or makes taboo for each sex whole areas of experiencing because of their sex (Torrance, 1964). This seems to take an unduly great toll upon the awareness and potential functioning of both boys and girls. Thus, it seems to me that one way of encouraging the development of creative potential is to provide materials which will help to correct some of this misplaced emphasis on sex differences. Even our vocational guidance materials in the earlier years could be more realistic. For example, we could have true stories of male nurses (and I understand there are some outstanding ones who find nursing congenial to the role and life of a man) and female dentists (and I understand there are some excellent ones who find this occupation quite congenial to the role and way of life of a woman).

Encouraging Elaboration as Well as Originality

There may be some danger that some of our current efforts emphasize originality of ideas to the relative neglect of elaboration. My own study of creativity, whether through the lives of eminent creative people or through the experiences of children and young people, convinces me that we need both the good elaborators and the highly original thinkers. In the dramas of the Great Moments of Discovery series, this characteristic comes out quite naturally and can be elaborated in many different ways. This ability also seems important in everyday adjustment. For example, one study of the thinking abilities of delinquent girls (Will, 1964) reveals their outstanding thinking characteristic to be their serious

inability to elaborate. Furthermore, reading specialists (Durrell and Chambers, 1958) have concluded from their research that exercises in elaboration are extremely promising in the development of good readers.

Different Materials for Different Kinds of Learners

A great variety of research (McConnell, 1934; Hutchinson, 1961; Gotkin and Massa, 1963; Grover, 1963) indicates that when we change teaching methods, a new class or classes of star learners emerge. If creative thinking abilities are called upon in the learning process, children with superior creative thinking abilities and motivations emerge as the stars. If these abilities are not used, these same individuals frequently fail to achieve. We have talked for many years about the need for individualization of instruction. It has occurred to me, however, that it might be easier and more practical to individualize instruction for different types of learners through differentiated curriculum materials than in traditional ways. This becomes especially urgent when we consider the increasing prevalence of large classes. Instructional materials might also be developed, however, to encourage greater curiosity and skills of creative thinking among children who have lagged in this kind of development.

Textbook Flexibility and Supplementary Materials

In searching for ways of making textbooks as flexible as possible and at the same time developing some of the skills of creative thinking and behaving, separate laboratory manuals, idea books, or work books might be developed. One section might be provided as an "idea trap" for the listing and development of provocative ideas, provocative questions, and the like. The remainder could be geared specifically to

specific content chapter by chapter. The exercises which require the reorganization and rearrangement of material, the development of syntheses of materials in order to solve problems, scanning for cues for problem solution, and the like could be included.

We can derive support for this and the idea for differentiating instructional materials for different kinds of learners not only from the studies of Hutchinson, Gotkin and Massa, Grover, and others, but from observations concerning changes in individuals which have resulted in field tests of materials such as the audio-tapes and the idea books. It is a common observation that some of the isolates and maladjusted children who do not ordinarily respond suddenly become alive and become excited about learning, when these materials are introduced.

Measures for Assessing Creative Achievement

Although measures for the assessment of educational outcomes are not commonly regarded as instructional media, they have such a profound influence upon instructional media and their use that it would be foolish to ignore developments in this area. Already there is considerable recognition of the need for achievement tests modeled somewhat after ability tests, but involving course content of course. In other words, people are beginning to ask for achievement tests that assess some of the new outcomes they are trying to achieve. Tests involving creative applications, judgments, and decision making are especially needed.

Educational research is quite strong and consistent concerning the fact that people tend to achieve along whatever lines they find rewarding. If achievement tests require creative responses, textbook writers and teachers will be motivated to find ways of encouraging this kind of

development and students will store information in such a way that it can be used in producing creative applications, making judgments and decisions, and the like. In my role as an examiner of doctoral candidates in Educational Psychology, I have noted a number of rather interesting side effects from my preliminary written examinations. One part of the examination involves the reading and evaluation of a research article in their field of specialization. They are instructed specifically to make their evaluation both critical and constructive. In fact, they are asked to discuss other possibilities concerning the researchers assumptions, statement of the problem, hypotheses, data collection procedures and devices, analysis of data, and interpretation of the findings. They are also asked to think of ways in which information from the article could be used in their special fields. At first, almost all candidates devoted their energies exclusively to the production of a critical evaluation of the article. Over the past six years, I have noted some rather gradual changes in this respect. I must admit, however, that some candidates still ignore this part of the examination or do quite poorly with it.

Materials for Use in In-Service Education

Although I was discouraged for a while about the value of materials for use in in-service education, a number of recent occurrences have given me new hopes and I do not think we can afford to neglect this area. Some of the bases for my new hopes come from the successes of others in adapting and adding onto some of the materials which we had created and used with relatively little success. For example, we carried out one rather ambitious in-service education project in which we

evaluated changes in pupil growth in creative thinking ability and creative writing. We produced a manual entitled, "Rewarding Creative Thinking," specially for use in this project (Torrance and Staff, 1964). We also assembled a collection of ideas for developing the creative thinking abilities through the language arts in the intermediate grades. The major theme of the in-service education program, however, was the consistent application of the following five principles:

1. Be respectful of the unusual questions of children.
2. Be respectful of the unusual ideas children present.
3. Show pupils that their ideas have value.
4. Encourage and give credit for self-initiated learning.
5. Give opportunities for practice or experimentation without immediate evaluation.

We were somewhat discouraged when we found that some of the control teachers used more of the experimental procedures than did the experimental teachers and that measured creative growth in favor of the experimental teachers was not altogether impressive.

A number of other practitioners and investigators have reported success with some of these same materials, however. For example, Enochs (1964) at the University of Missouri designed an in-service education program in which he used the manual on "Rewarding Creative Thinking" and encouraged the consistent application of the five principles listed above. In addition, he used an audio-video tape device of a mobile type. The experimental teachers watched and listened to these tapes and discussed them with the investigator. The discussions centered around the consistent application of the five principles for rewarding creative behavior. Enochs found that his experimental teachers

showed changes in attitudes and classroom behavior not shown by control teachers. The pupils of the experimental teachers also showed greater growth in originality and flexibility but not in fluency.

Currently, I am creating for THE INSTRUCTOR magazine (Torrance, 1964) a series of workshop ideas for creative classroom teaching in the elementary school. Each month, teachers and school staffs are encouraged to concentrate on a different idea, skill, or attitude. If taken seriously, I believe that these materials could have some very productive outcomes.

Lessons from History

In encouraging the development and evaluation of instructional media designed to evoke creative responses and facilitate creative growth, it is well to recognize the many obstacles deviations from accepted instructional media almost always encounter. I think two of the most serious ones are symbolized in the Braille story, the subject of one of our audio-tapes (Cunnington, Myers, Buckland and Peterson, 1962). Even after highly successful field testing for five years, Braille writing was not accepted for use in the education of blind children. Two powerful forces were responsible for this. The training schools fought the introduction of Braille writing because it would mean that their teachers would have to master new skills. The publishers also fought it because they would lose their investment in the enormous embossed books that were then in use. Although we find healthy attitudes among some teacher education institutions and publishers, any marked departure in instructional media from conventional materials is likely to meet with the solid and combined opposition of both groups. From personal experience, the standard routine seems to be for the publisher to consult selected

experts from the teacher education institutions. The expert then declares the innovation invalid. If the innovator is unwilling to accept this judgment, the publisher then consults some of the rank and file of teacher educators who declare that they would never select a textbook having such innovations.

These forces are perhaps strong enough to prevent support of research to test textbooks, but there is no reason why we cannot make some advances along these lines with some of the more inexpensively produced children's books, research reports, and the like. Quite briefly, the following is an example of one kind of experiment which I believe would be useful. The experimental materials would involve alternative forms of rewritten versions of journal articles. One variant might be a simple rewriting into the first person. Other variants could involve the injection of some of the textbook ideas already outlined. If these ideas proved to be successful, they would certainly be useful in constructing edited volumes of readings of research studies for instructional purposes.

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